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ABSTRACT

This paper presents an inservice education model for the feedback of information concerning a teacher's spontaneous classroom behavior. A trained observer classifies the teacher's statements using a matrix of ten categories. From a tabulation of matrix entries it is possible to make inferences concerning the teacher's attitudes and behavior with regard to the following: a) acceptance of students' feelings; b) praise and encouragement; c) acceptance of student ideas; d) question asking; e) lecturing; f) directing; and g) criticizing. It is also possible to tell from the matrix the amount of time the teacher talks, the students talk, and the amount of time the class spends in silence. As part of a 10-week in-service training program involving 53 teachers in Minnesota, interaction analysis serves two functions: a) as a pre- and post-measurement of success in helping teachers modify their overt behavior in order to make it more consistent with their self-development goals; and b) as a working tool to feed back information during training. (See related document SP 007 825.) (HMD)

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INTERACTION ANALYSIS: A TECHNIQUE FOR QUANTIFYING TEACHER INFLUENCE

by
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The Problem of Feedback in Teacher Training

We educational psychologists are in the field of human engineering, whether we like it or not, and must be concerned with how our knowledge can be applied to practical classroom situations. This means that our theoretical concepts ought to be coordinated to operational definitions that make sense under classroom conditions; our hypotheses and theories should point to issues of teaching practice that make a difference to teachers, and we must be prepared to participate ourselves in the first field applications of our ideas.

This paper is written from a human engineering point of view; it is concerned with how to organize information about the teacher's spontaneous verbal behavior and how to incorporate this information in a program of inservice training.

The problems of improving teacher preparation and inservice training programs extend like a massive cold front. These phenomena are quite common in Minnesota. You might note that the work we have done in interaction analysis so far has affected teacher preparation and inservice training to the same extent that lighting a match affects Minnesota weather. But we who come from the frozen north get a great deal of pleasure out of lighting a match and enjoy the warmth it sheds, however small.

As we see it, the major problem is: how can a teacher obtain objective information about his classroom behavior within one hour of its occurrence--information that is rich enough and clear enough to guide his first steps toward self-directed improvement? This is a question of feedback. The principle of feedback is becoming more popular. It supports

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equally Thorndike's renaissance in the field of learning machines, provides the cutting edge of triad training in human relations, and helps the Russians keep a rendezvous with Venus. Lack of adequate feedback has plagued teacher training for centuries, and no doubt was the major gripe of the neophytes in the high priesthood of the Pharaoh's court.

The principle of feedback is clear enough; its application in an engineering sense is quite another question. Just how can a teacher compare his performance with his own intentions under classroom conditions?

Blueprints for providing feedback in human relations training can be found in a number of references. A reference that should not be overlooked is Festinger's (1954) "Theory of Social Comparison Processes." Let me remind you of some of its most relevant hypotheses.

1. There exists, in the human organism, a drive to evaluate his opinions and abilities.

2. To the extent that objective, non-social means are *not* available, people evaluate their opinions and abilities by comparing them with the opinions and abilities of others.

Teachers are just as interested in comparing their opinions and abilities as any other individuals. With regard to teaching, most comparisons are made without benefit of objective methods. As a result, the comparisons are often abstract generalizations that have little relation to overt behavior, stereotypic value judgements are frequently expressed, and opinions are compared much more often than hard-to-define abilities.

3. The tendency to compare oneself with some other specific person decreases as the difference between his opinion or ability and one's own increases.

Teachers are equally prone to check each other's feathers before they flock together. The tendency to seek confirmation of current beliefs restricts innovation and the spirit of inquiry. Pressures toward uniformity that arise from such comparison processes present a formidable resistance

to change.

4. When an objective, non-social basis for evaluating one's opinion or ability is readily available, persons will not evaluate their opinions or abilities by comparison with others.

We can hope that this last hypothesis of Festinger's is correct. It suggests that a more objective system of feedback will be preferred by teachers. Yet, the premise that interaction analysis is more objective than swapping opinions does not decrease the initial resistance of teachers whose skepticism has had years of nourishment. The problem of creating incentives in inservice training remains.

We have developed a series of sound filmstrips to help create interest in an inservice training program designed to help teachers understand their control of classroom communication. The procedures of interaction analysis are explained. Special emphasis is given to the idea that any teacher, regardless of his style, may benefit because the feedback consists of an analysis of teacher statements, and we are sure that all teachers talk. We also point out that it is the job of the inservice staff to provide the feedback. It is the teacher's job to decide whether this information is consistent or inconsistent with his own intentions. He must decide what changes, if any, are desirable.

Matrix Interpretation: A Method of Feedback

Given ten categories, shown in Table One, into which all verbal statements are classified every three seconds by a trained observer, a series of numbers is produced. Each number is nominal in nature and the written record preserves the original sequence of events.

Such a series is entered into a matrix two at a time. The first number of each pair indicates the row of the matrix, the second the column. The first pair consists of the first two numbers. The second pair consists of the second and third numbers, and thus overlaps the first pair. All tallies enter the matrix as a series of overlapping pairs.

TABLE ONE

Categories for Interaction Analysis

TEACHER TALK	INDIRECT INFLUENCE	1.* *ACCEPTS FEELING:*--accepts and clarifies the feeling tone of the students in a non-threatening manner. Feelings may be positive or negative. Predicting or recalling feelings are included.
		2.* *PRAISES OR ENCOURAGES:*--praises or encourages student action or behavior. Jokes that release tension, but not at the expense of another individual; nodding head, or saying "um hm?" or "go on" are included.
		3.* *ACCEPTS OR USES IDEAS OF STUDENTS:*--clarifying, building, or developing ideas suggested by a student. As teacher brings more of his own ideas into play, shift to category five.
		4.* *ASKS QUESTIONS:*--asking a question about content or procedure with the intent that a student answer.
	DIRECT INFLUENCE	5.* *LECTURING:*--giving facts or opinions about content or procedures; expressing his own ideas, asking rhetorical questions.
		6.* *GIVING DIRECTIONS:*--directions, commands, or orders to which a student is expected to comply.
		7.* *CRITICIZING OR JUSTIFYING AUTHORITY:*--statements intended to change student behavior from non-acceptable to acceptable pattern; bawling someone out; stating why the teacher is doing what he is doing; extreme self-reference.
STUDENT TALK		8.* *STUDENT TALK--RESPONSE:*--talk by students in response to teacher. Teacher initiates the contact or solicits student statements.
		9.* *STUDENT TALK--INITIATION:*--talk by students which they initiate. If "calling on" student is only to indicate who may talk next, observer must decide whether student wanted to talk. If he did, use this category.
		10.* *SILENCE OR CONFUSION:*--pauses, short periods of silence and periods of confusion in which communication cannot be understood by the observer.

*There is NO scale implied by these numbers. Each number is classificatory; it designates a particular kind of communication event. To write these numbers down during observation is to enumerate, not to judge a position on a scale.

With one tally every three seconds, there are 100 tallies for five minutes, 1200 tallies per hour. Twenty minutes, or about 400 tallies, provide a matrix with sufficient data for a number of inferences about verbal communication. However, if the communication itself is restricted, so are the inferences that can be made from the matrix.

In a sustained observation of a teacher covering six to eight one-hour visits, it is necessary to tabulate separate matrices for different types of classroom activities. Each matrix should represent either a single episode of class activity or any number of homogeneous episodes that are combined. We use five activity categories for junior high school academic subjects; they are: routine procedures, discussion of new material, discussion to evaluate student performance, general discussion, and the supervision of seatwork or group activities.

A more detailed description of the procedures of classroom interaction analysis, as it it used at Minnesota, can be found in "Interaction Analysis: A Manual for Observers" (Flanders, 1960a).

The tabulated matrix divides into special areas for interpretation that are shown in Table Two. Particular questions can be answered by comparing tallies within and between these areas. Here are some examples:

Areas A, B, C, and D can be used to find the percent time the teacher talks, the students talk, and time spent in pauses, silence, and confusion. Comparing Areas A and B only indicates the percent of teacher statements we call indirect and those we call direct. Indirect influence tends to expand the student's freedom of participation, direct influence tends to restrict this freedom.

Area E is a block of nine cells that indicates the continued use of acceptance and praise, and transitions among these categories while the teacher is talking. The 3-3 cell in this block indicates extended teacher acceptance and clarification of student ideas.

Area F is a block of four cells that indicates the continued use of directions and criticism and transitions between these two categories.

TABLE 2

Areas of Matrix Analysis

CATEGORY	CLASSIFICATION	CATEGORY	1	2	3	4	5	6	7	8	9	10	TOTAL
ACCEPTS FEELING	INDIRECT INFLUENCE	1	Area E										
PRAISE		2											
STUDENT IDEA		3											
ASKS QUESTIONS		4	"Content Cross"							Area H			
LECTURES	DIRECT INFLUENCE	5											
GIVES DIRECTIONS		6						Area F					
CRITICISM		7											
STUDENT RESPONSE	STUDENT TALK	8	Area G_1					Area G_2		Area I			
STUDENT INITIATION		9											
SILENCE	SILENCE	10											
		Total	Area A					Area B		Area C			Area D
			Indirect Teacher Talk					Direct Teacher Talk		Student Talk			Silence

The two transition cells are particularly reliable indicators of discipline problems. Shifting from directions to criticism is tallied in the 6-7 cell, and indicates that expected compliance is judged unsatisfactory by the teacher. Shifting from criticism back to directions, the 7-6 cell, indicates a return to more directions after criticism.

Areas G_1 and G_2 are particularly interesting because they isolate the immediate response of the teacher at the moment students stop talking. One aspect of teacher flexibility can be discovered by comparing the balance of indirect and direct statements shown in G_1 and G_2 with those found in areas A and B. The difference between superficial, short, perfunctory praise or clarification, and praise or clarification that is more carefully developed is easily seen by comparing the tallies in Area G_1 with those in E, particularly the 2-2 and 3-3 cells.

Area H indicates the types of teacher statements that trigger student participation. Responses to the teacher are found in column 8; statements initiated by the student in column 9. As one might expect, there is usually a heavy loading of tallies in the 4-8 cell. High frequencies in this cell and the 8-4 cell, but not in the 8-8 cell, often indicate rapid drill.

Area I indicates sustained student participation. These may be lengthy statements by a few teachers, or student-to-student communication.

So-called "steady state" cells fall on the diagonal from cell 1-1 to 10-10. Tallies here indicate that the speaker persists in a particular communication category for longer than three seconds. All other cells are transition cells moving from one category to another.

Outlined in the center of Table Two by dash lines is the content cross. The total number of tallies in this area, compared with tallies not in this area, gives a very crude indication of the content orientation of the class activity.

From our brief experience in using a matrix to feed back information to a teacher, we have formulated the following operating principles:

First, we avoid interpreting a teacher's own interaction matrix until he has had training in the use of the categories, in tabulating a matrix, and interpreting some training matrices involving data other than his own.

Second, we avoid reference to the matrix until the teacher has formulated a question about his teaching, discussed the criteria for identifying an answer, and has speculated on different possible answers.

Third, we encourage teachers to form teams of two or three, to observe each other and to discuss the results, preferably with the help of a trained observer-consultant. The same person acts as observer, then as consultant.

A Case Study Illustrating Matrix Consultation

The case study which follows illustrates how a matrix can be used to feed back information to a teacher. First, a blind analysis will be made of the matrix. This is a game our staff plays, in which as many statements as possible are made about the verbal interaction, based solely on the matrix itself. Next, information from the observer who collected the data will be added. Finally, recommendations will be made in terms of the teacher's goal for self-improvement.

In this case, an observer entered the classroom of a 24-year-old male teacher of junior high school social studies, who had requested an observation in the fourth week of a ten-week inservice training program. During the inservice training, the teacher became familiar with the technique of interaction analysis, the tabulation and interpretation of matrices, and caught something of the spirit of inquiry which has successfully developed. A discussion that lasted about 18.5 minutes was observed. The matrix is shown in Table Three.

Blind Analysis of a Matrix

The following interpretations can be made of Table Three by anyone trained in matrix analysis, whether he was present at the observation or not.

TABLE 3

Observation Matrix

CLASS CODE NO._____ OBSERVER_____ DATE_____

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL TALLIES
1	-	-	-	-	-	-	-	-	-	-	-
2	-	1	1	1	2	-	-	1	5	-	11
3	-	-	5	1	4	-	-	-	-	-	10
4	-	-	-	23	2	1	-	42	3	5	76
5	-	2	1	22	80	1	2	3	3	3	117
6	-	-	-	1	-	-	1	3	-	-	5
7	-	-	-	-	2	1	1	-	-	-	4
8	-	5	-	22	19	-	-	45	7	-	98
9	-	3	3	3	7	-	-	3	32	-	51
10	-	-	-	3	1	2	-	1	1	-	8
TOTAL TALLIES	-	11	10	76	117	5	4	98	51	8	380
%	-	2.9	2.6	20.0	30.8	1.3	1.1	25.8	13.4	2.1	
of	25.5				33.2			39.2		2.1	100.0
Total	Teacher Total: 58.7							Student Total		Si-lence	

I/D = 0.77 $I/D_{8,9}$ = 1.38 Steady State = 49% Content Cross = 70.8%

First, student participation (39.2%) is well above an average of 20% that would be expected in six or more hours of observation in a normal academic classroom.

Second, verbal participation was very active, with few pauses, as shown by the low incidence of tallies in category ten.

Third, the 49 percent of tallies falling into the steady state cells is about average, indicating that both the students and the teacher had the opportunity to expand their ideas once they started to talk.

Fourth, the ideas discussed were determined by the teacher, for the most part, since on only 11 occasions (5 + 3 + 3 in the nine column) did a student initiate his own idea. This high incidence in the 4-8 cell (42 tallies) also supports this inference.

Fifth, no assignments or lengthy directions were given (see column six), and there were no important discipline problems (see Area F).

Sixth, very few of the ideas expressed by students were clarified or developed by the teacher (see low frequencies in the 8-3 and 9-3 cells), and the teacher's use of student ideas did not lead to teacher questions, except in one instance (see the 3-4 cell). Questions posed by the teacher must have been used to introduce his own ideas which were somewhat different from those of the students. Notice that on 51 occasions (rows 8 and 9, columns 4 and 5: 22 + 19 + 3 + 7) out of 62 (add 3 + 3 + 5 in rows 8 and 9, columns 2 and 3) the teacher introduced his own ideas by questions or lecture at the termination of student talk.

To summarize: this is an active, teacher-directed discussion, with few pauses. The teacher did not develop ideas suggested by the students, but preferred to move onto other ideas of his own choice. Both the teacher and the students took time to expand their ideas once they started to talk. The ratio of indirect to direct total teacher talk is 0.77, which is about average for academic teachers. The same ratio for rows 8 and 9 is 1.38, which shows some flexibility of teacher influence.

This analysis raises the unanswered question: why is student participation so high when praise and clarification of student ideas are so low?

Subjective Reactions of the Observer-Consultant

The reactions of the trained observer will now be combined with the inferences from the blind matrix analysis. Some of the reactions of the teacher were taken from a tape recording of the observer-consultant's interview with the teacher following the observation.

The teacher requested the observation in the first place, after making his own tape recording of a class discussion. He decided, after listening to it, that his own verbal participation was too high, over 75 percent. He wanted the consultant to check his progress in stimulating more student participation. He thought 75 percent was too high because "I believe in the Socratic method of teaching. Socrates was a wise man who asked such good questions that other people learned a lot trying to formulate answers."

Notice that when questioned about his self-selected goal, he refers to a stereotypic ideal that relates to his own behavior primarily in terms of asking more questions. Apparently, this teacher's theory about how to increase student participation is limited to asking more questions and ignores other important aspects of teacher behavior.

Other statements in the recorded interview indicate that this young teacher "wants to be close to his students," and "wants to be well-liked," particularly by this class, which is his "favorite" and consists of the highest ability section of the ninth grade.

His interview also revealed a conflict between his rather benign teacher ideal and subject matter competence which he expressed in terms of high intellectual standards for both himself and his students. Statements from different parts of the recording highlight this conflict: for example, "I talk too much," versus "I like to tell the students the 'big idea' behind their assignments"; "students should learn to think for

themselves" versus "the issues (in today's session) require the interpretation of an adult."

The trained observer who conducted the observation and interview said, when the tape recording was played at a staff meeting, "I got the impression that this young teacher was just as eager to express his own ideas as were his very bright students to express theirs. This class seemed like a competition between the students and the teacher...the teacher kept the dominant position...many students raised their hands to speak...talk was distributed among at least half of the class."

Incidentally, this additional information answers the question raised in the blind analysis. The reason that there was high verbal participation by students in spite of low indirect influence by the teacher was that the students were interested and eager to express their ideas after the reading assignment. Motivation for participation was high, and the role of the teacher was primarily to control their enthusiasm, regulate communication, and introduce his own ideas.

Discussion and Recommendations

This teacher's goal for self-improvement, which he selected, is to increase student verbal participation during class discussions. The results show that he was successful when the matrix is compared with his own analysis of an earlier tape recording. His obvious relief at this success helped to reduce his insecurity and dependence on the consultant, which were exceptionally high at the beginning of the interview. This positive outcome of an initial experience will help to stimulate further exploration of his own role during the inservice training.

It will be the strategy of the consultant to help the teacher accomplish this goal in spite of two difficult problems that are not yet solved. First, the chances are good that this teacher lacks those skills necessary to make constructive use of student ideas in the discussion of content problems, and furthermore, he shows little understanding of a theory of how a teacher can accomplish this. The second problem is that

he has a personal conflict of values--his role as a friend of students versus his role as a content expert--that must be resolved. Each of these problems will now be discussed.

The statement of the first problem was phrased problematically because the low incidence of tallies in columns 1, 2, and 3 is not conclusive evidence that this teacher lacks those skills necessary to integrate student ideas into class discusison. However, it is strong evidence, since a teacher who possesses these skills is not likely to ignore student ideas, even under conditions of high motivation, to the extent shown in the matrix.

We have no research evidence to support the notion that an increase in student verbal participation *per se* improves learning. We do have research results to indicate that students learn more working with teachers who skillfully elicit, clarify, and challenge student ideas (Flanders, 1960b). Merely increasing student participation by asking questions is not enough.

The question that confronts the consultant is how to create an experience in which the young teacher will recognize the inadequacy of his present analysis, without reducing his incentive toward further self-directed experimentation. One alternative is to suggest observing a class discussion in which new material or a new unit of study is introduced. In this situation, the problems of motivating student interest will be more pressing, and could more easily become the focus of another interview with the teacher. With such a focus, the consultant could steer the conversation naturally to the teacher's skills of clarifying and using student ideas constructively in class discussion.

The second problem of being a friend of students versus a content expert is no issue to a mature, gifted, master teacher. At the time this paper is written, the problem was not recognized by the young teacher, and probably would be denied or rejected if suggested in an interview. The problem, in fact, is a conjecture of the inservice training staff made after listening to the tape recording of the consultant-teacher interview.

This conjecture arose as an explanation of why a teacher would ask questions, but tend to ignore student answers, a pattern which stands out in the matrix. Our staff hypothesized that he asks questions to be friendly and to engage students in interaction; yet his responsibilities as a content expert force him to move on to the next topic by asking questions, and to correct misconceptions by lecturing.

Conjectures of this sort serve a useful purpose only if they help the consultant anticipate some of the responses this teacher will make in future contacts. In this case, it also provides a clue that the consultant might use in working with the teacher. If this case analysis is correct, it suggests that the teacher may recognize the value of making use of the students' ideas *providing* the explanation is in terms of improving the *students'* understanding of content.

Three recommendations can now be made. First, this teacher should be encouraged to have another observation in which he is more likely to recognize the need for accepting, clarifying, and using the ideas of students. Introducing new material or new class procedures are examples.

Second, in discussing the matrix of this proposed observation, the consultant should help the teacher analyze how he can use student ideas and diagnose misconceptions and improve understanding. It may also be valuable to discuss how such teacher behavior is tabulated and would appear in a matrix, i.e., discuss Areas E and G_1.

Third, if the teacher grasps these ideas in terms of the students' better *understanding of content* first, he may then wish to explore them further in terms of *motivation* and *developing interest*.

Summary

This paper has been concerned with how to feed back information about a teacher's spontaneous classroom behavior by some method that leads to constructive self-improvement. A single case was discussed, showing how a matrix, which consists of a tabulation of teacher and

student statements, can be used. Considerable emphasis was given to an approach in which the teacher selects his own goal for self-improvement, while a trained observer helps to collect and interpret the information needed for feedback.

We are using this technique in Minnesota as part of a ten-week inservice training program. Some of the 53 teachers involved work individually with staff observers. Others form small groups of three to five teachers in order to observe each other under the guidance of a staff member.

Interaction analysis serves two functions in this project. First, it is being used as a pre-and post-measure of success in helping teachers modify their overt behavior, in order to make it more consistent with their own self-improvement goals. Second, it is used as a working tool to feed back information during training.

In its present form, interaction analysis is cumbersome and expensive. It is also rather a crude instrument for such a delicate task; but as one teacher put it, "You don't need a razor to cut butter."

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